TABLE A-1 (page 3 of 3) INTERNATIONAL ALLOCATIONS IN THE 1710-2290 MHz BAND

- Additional allocation: in Bulgaria, Cuba, Hungary, Mali, Mongolia, Poland, the German Democratic Republic, Roumania, Czechoslovakia and the U.S.S.R., the band 1770-1790 MHz is also allocated to the meteorological-satellite service on a primary basis, subject to agreement obtained under the procedure set forth in Article 14.
- 746A The frequency bands 1885-2025 MHz and 2110-2200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement the future public land mobile telecommunication systems (FPLMTS). Such use does not preclude the use of these bands by other services to which these bands are allocated.
- 746U In the United States of America, the use of the bands 1970-2010 MHz and 2160-2200 MHz by mobile-satellite service shall not commence before 1 January 1996.
- 746X The use of the bands 1970-2010 MHz and 2160-2200 MHz by the mobile-satellite service shall not commence before 1 January 2005 and is subject to the application of the coordination and notification procedures set forth in Resolution COM5/8. In the band 2160-2200 MHz coordination of space stations of the mobile-satellite service with respect to terrestrial service is required only if the power flux-density produced at the Earth's surface exceeds the limits in No. 2566. In respect of assignments operating in this band, the provisions of Section II, paragraph 2.2 of Resolution COM5/8 shall also be applied to geostationary transmitting space stations with respect to terrestrial stations.
- 747A In making assignments to the mobile service in the bands 2025-2110 MHz and 2200-2290 MHz, administrations shall take into account Resolution COM4/2.
- 750A Administrations are urged to take all practicable measures to ensure that space-to-space transmissions between two or more non-geostationary satellite, in the space research, space operations and Earth Exploration-satellite service in the bands 2025-2110 MHz and 2200-2290 MHz, shall not impose any constraints on Earth-to-space, space-to-Earth and other space-to-space transmissions of those services and in those bands between geostationary and non-geostationary satellites.

APPENDIX B EXTRACTS OF NTIA REPORT 92-285

The extracted summary findings of NTIA Report 92-285 for the 1710-1850 MHz band is contained herein. In general, the 1710-1850 MHz band supports fixed, mobile and space systems; however, the fixed microwave systems are primary medium capacity used by the Federal Government. In addition, the band is also the primary tracking, telemetry and command (TT&C) uplink band for Federal Government satellite systems. The average annual frequency assignment growth rate in the band is about 15% (i.e., 1250 assignments in December 1978 to 5539 assignments in March 1990). It should be recognized, however, that the 1710-1850 MHz band cannot be measured alone without the dependent space operation band, 2200-2290 MHz band. The growth trend in the 1710-1850 MHz band, and the continued capital investment into space systems in the 2200-2290 MHz band, definitely indicates the continued importance of these bands to the Federal Government and the entire nation.

1710-1850 MHz Band

- a. Nationally, the 1710-1850 MHz band is allocated exclusively to the Federal Government for the fixed and mobile services on a primary basis with the Earth-to-space transmissions for certain space operations being accommodated on a co-equal basis in the 1761-1842 MHz portion of the band. Footnotes 722, US256 and G42 apply.
- b. Internationally, the 1710-1850 MHz range is allocated exclusively for fixed and mobile services in Regions 1, 2, and 3 on a primary, co-equal basis, except in Region 1 where the mobile is secondary to the fixed service.
- Internationally, Earth-to-space transmissions in the 1750-1850 MHz frequency range is allowed in Region 2 and several other countries for space operation and space research services.
- d. Radio astronomy observations are being carried out at several facilities in the United States on the spectral line due to the hydroxyl radical (OH) at a rest frequency of 1720.530 MHz on an unprotected basis.
- e. The 1710-1850 MHz band is the predominant federal medium-capacity fixed point-topoint band. The fixed is the predominant service used in the band. About 87% of the total assignments in the band are for systems operating in the fixed service.
- f. Currently, 22 agencies have assignments in this band. The primary users of the band are shown in TABLE B-1.
- g. Over the past 11 years, the number of assignments has increased almost fivefold. The average annual assignment growth rate in the band is approximately 15%.

TABLE B-1
GMF ASSIGNMENTS BY AGENCY IN THE 1710-1850 MHz BAND

Agency	Number of Assignments	Percent of Total Assignments ^a
Agriculture	1373	25
Army	790 ^b	14
Justice	722	13
Energy	652	12
Air Force	640	12
Navy	450	8
Others	912	16

^aThe percentages of the total assignments are rounded-off.

- h. A wide variety of systems are employed in the band characterized by at least 36 emission types and a range of authorized emission bandwidths from 40 kHz to 70 MHz. The most predominant emission type is F9W (FDM/FM) and the most common bandwidths range from 800 kHz to 10 MHz.
- i. Although there is no NTIA sanctioned channeling plan in the band, the discrete distribution of frequency assignments occurs generally at every 5 MHz intervals starting at 1710 MHz.
- j. The number of Space Ground Link Subsystem uplink assignments to support the tracking, telemetry, and control of DOD orbiting satellites has increased 36% from December 1978 to March 1990.
- k. The 1710-1850 MHz is the predominant band used by the Army for command and control employing an area-wide grid network system. Typically, there are over 200 communication links for an area network system. The frequency assignments supporting these links are not recorded in the GMF.

^bDoes not include the temporary assignments that support the area-wide command and control network system.

APPENDIX C SPECTRUM USE MEASURE

INTRODUCTION

The Spectrum Use Measure (SUM) model²⁹ develops data that represents the extent of use of a radio frequency band. The data contain spectrum use values for test points spaced at even intervals of latitude and longitude throughout the geographic area of interest. Frequency assignments from the Government Master File (GMF) of frequency assignments provide the basic input data on existing systems. Automated calculations are performed for test points in the vicinity of each existing transmitter and receiver, resulting in the SUM data base. The data can then be presented in the form of maps, histograms and/or indices describing the extent of use of the frequency band.

The use of part of a frequency band at a test point by existing systems means that that part of the frequency band is unavailable for a hypothetical new system (called the reference system) at that location. Frequencies are made unavailable because of the potential for interference either from existing transmitters to the reference receiver or from the reference transmitter to existing receivers. The extent of spectrum use at a test point is dependent upon both the existing systems and the characteristics of the reference system.

Spectrum-area used for any one transmitter-receiver pair is the union of spectral bandwidth and geographical area in which the authorized transmitter-receiver system would either 1) cause the carrier signal-to-interference (C/I) ratio of a hypothetical reference receiver to be less than a certain value, or 2) suffer a reduction of its C/I ratio below a certain value due to a hypothetical reference transmitter. The hypothetical transmitter-receiver combination is termed the reference system, and has technical parameters corresponding to systems operating in a specified service. The reference system represents a new system, which, for analysis purposes, is assumed to operate at various geographic locations.

The reference system has assumed technical parameters of e.i.r.p., emission bandwidth, and receiver intermediate frequency (IF) bandwidth that are the median values for all the sytems authorized in the frequency band of interest. To analyze the potential for accommodating the reference system in the electromagnetic environment, this reference system is analytically moved among a series of test points in the vicinity of the authorized system to evaluate the impact caused to it and to the authorized system. The test points are contained in a box (rectangular for fixed systems, circular for mobile systems) and are the focus of points enclosing the geographical limits of potential interference, based on the parameters of the systems. The test points are spaced at specified increments (e.g., 5 minutes in latitude and longitude).

²⁹ Mayher, Robert J., et al.

Appendix C SUM Model

Those geographical locations, as represented by the test points and at which the authorized system or the reference system suffer a reduction in the received C/I ratio, are considered to be locations used by the authorized system over its interference bandwidth. The reference system is then stepped through all the test points in the box and the data regarding the potential interference is saved in an array. This procedure is repeated for each authorized system in the frequency band and area of interest. The data from all authorized systems is aggregated for each test point. This data forms the basic SUM data base.

The SUM data can be contoured to show the amount of spectrum in the frequency band of interest that is used in any location. The spectrum used is aggregated and displayed as contours. For example, a contour with a value of 150 MHz would enclose an area where all locations "used" 150 MHz of the frequency band.

CALCULATION OF SPECTRUM USE

A location is "used" by the assigned systems in a certain frequency band if, hypothetically, the reference station at that location would either cause unacceptable interference to one or more assigned systems or experience unacceptable interference from one or more assigned systems. The criterion for unacceptable interference is the ratio of received carrier power to interference power (C/I ratio): if the C/I ratio at the receiver is less than the threshold value (C/I_{th}), an unacceptable interference condition is assumed.

The carrier power at a receiver from the associated transmitter is:

$$C = P_D + G_D(0) + G_B(0) - L_{FS}(d_D)$$
 (1)

where:

C = Desired carrier power at the receiver, in dBW

P_D = Power of the desired transmitter, in dBW

 $G_{D}(0)$ = Mainbeam gain of the desired transmitter antenna, in dBi

 $G_R(0)$ = Mainbeam gain of the receiver antenna, in dBi

 $d_{\rm D}$ = Distance between the desired transmitter and the receiver, in km

 $L_{FS}(d_D)$ = Free space loss associated with the distance d_D , in dB

The transmitter power and the antenna gains are provided in the GMF records. The distance between the transmitter and the receiver can also be determined from GMF data. In this way, the desired carrier power can be determined for a link.

The power at the receiver from an interfering transmitter is:

Appendix C

SUM Model

$$I = P_1 + G_1(\Theta_1) + G_R(\Theta_R) - L_P(d_1) - FDR$$
 (2)

where:

I = Interference power at the receiver, in dBW

P₁ = Power of the interfering transmitter, in dBW

Θ_I = Angle at the interfering transmitter between the direction to the receiver and the mainbeam direction, in degrees

 $G_i(\Theta_i)$ = Gain of the interfering transmitter antenna Θ_i° off the mainbeam, in dBi

Θ_R = Angle at the receiver between the direction to the interfering transmitter and the mainbeam direction, in degrees

 $G_R(\Theta_R)$ = Gain of the receiver antenna Θ_R° off the mainbeam, in dBi

d_i = Distance between the interfering transmitter and the receiver, in km

 $L_p(d_i)$ = Propagation path loss associated with the distance d_i , in dB

FDR = Frequency dependent rejection of the interfering signal by the receiver IF filter, in dB

<u>Spectrum Use Bandwidth</u>. The spectrum use bandwidth (SUB) at a test point, the total bandwidth used at that test point by assigned systems, is determined using Equation 3:

SUB =
$$BW_{int}$$
 if $L_I < L_{lth}$
= 0 otherwise (3)

1 1701 1 101 1

where:

1111 Thm

SUB = Spectrum use bandwidth at the test point, in MHz

BW_{int} = Bandwidth over which interference will occur, in MHz

The data required to make a very basic model of the assigned system is provided in the GMF. This data generally includes transmitter and receiver locations and elevations, transmitter power and bandwidth and transmitter and receiver antenna gains and antenna heights. The desired carrier power can then be computed at each receiver (there may be more than one receiver associated with a transmitter) using Equation 1 above.

Appendix C SUM Model

For the reference system, the transmitter power and bandwidth, the antenna gains, the effective antenna heights and the desired carrier power at the receiver are set to the median values for the fixed service assignments in the band being analyzed. The user may choose other values for the reference systems.

For this study, the following reference system parameters were used:

Type of Service Fixed
Transmitter power 5 Watts

Antenna gain O dBi (est. sidelobe gain)

Bandwidth 5 MHz
Median received power -65 dBW

Test points 5 minute intervals

The FDR term in Equation 2 is calculated using Equation 4:

FDR =
$$10\log(BW_I/BW_R)$$
 if $BW_I > BW_R$
= 0 otherwise (4)

where:

BW_I = Bandwidth of the interfering signal, in MHz

BW_R = IF bandwidth of the desired receiver, in MHz

The necessary bandwidths listed in the GMF are used for the assigned systems and for determining the median value for the reference system.

The C/I protection ratio used in the model are: 60 dB for co-channel interference and 0 dB for adjacent-channel interference (corresponding to 60 dB off-frequency rejection in the adjacent channel).

 BW_{int} (from Equation 3) is the bandwidth over which co-channel or adjacent-channel interference occurs. For co-channel interference, BW_{int} is assumed to be the sum of the assigned and reference system necessary bandwidths. For adjacent-channel interference BW_{int} is assumed to be three times the co-channel interference bandwidth.

<u>Propagation Loss.</u> The propagation loss between a transmitter and a receiver is a function of the distance between them. For determination of the desired carrier power, the propagation loss is based on the distance between the transmitter and the receiver of the assigned system. For determination of the desired carrier power, free space loss is used. This is appropriate, except for transhorizon systems. Using free space loss, the desired carrier power calculated at the receiver of a transhorizon system will be unreasonably large, resulting in excessively small use areas for transmitters.

Appendix C SUM Model

The Integrated Propagation System (IPS) model is used to determine the propagation loss for interference paths. This model includes diffraction and transhorizon modes as well as the free space mode. The model chooses the appropriate mode based on the path length and the antenna heights.

When using a smooth-earth model like the IPS, an effective antenna height is used for the transmitter and receiver stations. The effective antenna height is the difference between the height of the antenna above mean sea level (the sum of the site elevation and the height of the antenna above the ground) and the average elevation of several points in the direction of propagation. Since the use of detailed elevation data is not practical when large areas are being analyzed, a simpler method of determining the average elevation in the vicinity of a site was needed. A file containing average elevation values for points every fifteen minutes of latitude and longitude was used. The average elevation values were calculated by averaging 30" data within a 25 km radius of the center point. To determine the effective antenna height for an assigned station, the antenna height was added to the difference between the elevation given in the GMF and the average elevation (but not less than zero). For the reference station, the median antenna height alone was used since the test point site was assumed to be at the average elevation.

The user enters a value for the elevation above mean sea level of all airborne stations. The default value is 15,000 ft. The average elevation is subtracted from this value to obtain the effective antenna height.

CCIR Report 614-230 provides reference antenna Antenna Radiation Patterns. patterns for radio-relay systems. The basic pattern is:

$$G(\phi) = 52 - 10\log(D/L) - 25\log(\phi)$$
 (5)

where:

Gain of the antenna ϕ degrees off the mainbeam, in dBi $G(\phi)$

D Diameter of the parabolic reflector

Wavelength of the carrier

When the reflector diameter is not known, CCIR Report 391-5, Annex 131 suggests the following estimate be used:

CCIR, Reference Radiation Patterns for Radio-Relay System Antennas, Report 614-2, Volume IX - Part I, International Telecommunication Union, Geneva, Switzerland, 1986, pp 270-274.

CCIR, Radiation Diagrams of Antennas for Earth Stations in the Fixed-Satellite Service for Use in Interference Studies and for the Determination of a Design Objective, Report 391-5, Volume IV - Part I, International Telecommunication Union, Geneva, Switzerland, 1986, pp 138-156.

Appendix C

SUM Model

$$20\log(D/L) \approx G_{max} - 7.7 \tag{6}$$

where:

 G_{max} = Mainbeam gain of the antenna, in dBi

In the vicinity of the mainbeam, Report 391-5 suggests the following:

$$G(\phi) = G_{max} - .0025[(D/L)\phi]^2$$
 (7)

Between the curves of Equations 7 and 5, Report 391-5 suggests a constant value for the first sidelobe gain:

$$G_1 = 2 + 15\log(D/L)$$
 (8)

where:

 G_1 = Gain of the first sidelobe, in dBi

For frequency re-use problems assuming parallel polarization, CCIR Report 614-2 recommends 0 dBi residual gain up to 90° and -15 dBi residual gain between 90° and 180°. This means that Equation 5 is used for angles ϕ up to the point where $G(\phi) = 0$ dBi. A constant value of 0 dBi is then used for $G(\phi)$ up to 90°. Beyond 90°, $G(\phi) = -15$ dBi.

This model is used for all antennas having a mainbeam gain greater than 10 dBi. For antennas having a smaller mainbeam gain, the gain is assumed to be constant in all directions.

APPENDIX D ADDITIONAL DISCUSSION ON RELIABILITY

This appendix contains a series of microwave reliability calculations based on atmospheric multipath for 2 and 6 GHz links under a variety of conditions. Typical equipment parameters are used in the calculations. The calculations were based on a standard method for calculation developed at Bell Telephone Laboratory in 1975.³⁰ These calculations do not take into account the effects of atmospheric ducting.

Eight key parameters should be noted in these calculations. The <u>frequency</u> in GHz is indicated near the top of each calculation sheet. Results are presented alternatively for 2 GHz and 6 GHz for same conditions. The indicated <u>path length</u> were used over various distances up to 50 miles. The indicated <u>antenna size</u> was selected so that adequate reliability could be achieved. The calculations were performed for a variety of <u>radio equipment types</u> including digital and analog. Two different <u>terrain/climate factors</u> were used based on Figure 4-3 in the text, with a value of 6 representing a very difficult propagation area and 0.25 representing an ideal propagation area. The final key parameters are the calculated <u>non-diversity outage time</u> and <u>space diversity outage time</u> in seconds per year. The final key parameter <u>Bell short haul objective</u> is a design objective for outage that varies with path length.

The following table summarizes the results with a key to indicate the page number of the detailed calculation. For all of the cases studied here, the reliability of the 2 and 6 GHz band were comparable.

TABLE D-1
COMPARISON OF RELIABILITY RESULTS FOR VARIOUS CONDITIONS

	1	PATH		ANT.	RADIO		OUTAGE	
PAGE	BAND	LENG.		SIZE	PROPAGATION	DIVERSITY	TIME	OBJECTIVE
NO.	GHz	MILES	MODULATION	FEET	AREA	REQUIRED	SEC.	SECONDS
D-2	2	15	96 CHAN DIGITAL	8	VERY DIFFICULT	NO	39	96
D-3	6	15	96 CHAN DIGITAL	8	VERY DIFFICULT	NO	35	96
D-4	2	25	96 CHAN DIGITAL	12	VERY DIFFICULT	NO	114	160
D-5	6	25	96 CHAN DIGITAL	12_	VERY DIFFICULT	NO	160	160
D-6	2	35	96 CHAN DIGITAL	8	VERY DIFFICULT	YES	122	224
D-7	6	35	96 CHAN DIGITAL	8	VERY DIFFICULT	YES	7	224
D-8	2	15	672 CHAN DIGITAL	8	VERY DIFFICULT	YES	45	96
D-9	6	15	672 CHAN DIGITAL	8	VERY DIFFICULT	YES	2	96
D-10	2	25	672 CHAN DIGITAL	12	VERY DIFFICULT	YES	118	160
D-11	6	25	672 CHAN DIGITAL	8	VERY DIFFICULT	YES	129	160
D-12	2	30	672 CHAN DIGITAL	12	VERY DIFFICULT	YES	1282*	192
D-13	6	30	672 CHAN DIGITAL	12	VERY DIFFICULT	YES	95	192
D-14	2	30	600 CHAN ANALOG	8	IDEAL	NO	45	192
D-15	6	30	600 CHAN ANALOG	8	IDEAL	NO	10	192
D-16	2	50	600 CHAN ANALOG	10	IDEAL	NO	163	320
D-17	- 6	50	600 CHAN ANALOG	10	IDEAL	NO	50	320

^{*} CANNOT ACHIEVE OUTAGE OBJECTIVE

³⁰ Vigants, A., et al.

US DEPARTMENT (MICROWAVE RADIO PATH C			ET	30-Jul-92
PROJECT NAME	-	?		
INGINEER	•	?		
Birolifa No. (Gr.)		1.90		
1. SITE NAME	 	1		
3. LATITUDE, North,	Degrees	?		-
	Minutes	?		
	Seconds	?		·
4. LONGITUDE, West,	Degrees	?		
	Minutes	7		
	Seconds	?		1
5. SITE ELEVATION, AMSL	Feet	?		
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
73 PATH LENGTH	Miles		15.0	
8. PATH ATTENUATION	d8		125.7	
10. TOWER TYPE	 	?		
11. ANTENNA HEIGHT, AGL	Feet	130		130
12. TRANSMISSION LINE LENGTH 13. TRANS. LINE TYPE	Feet	140	!	140
13. TRANS. LINE 117E	dB/100'	7/8" FOAM 2.00	<u> </u>	7/8" FOAM
15. TRANSMISSION LINE LOSS	dB/100	2.8		2.00
16. MISCELLANEOUS LOSSES	dB	0.5		0.5
17. PROTECTED TERMINAL LOSS	dB	7		0.0
18. DIVERSITY RECEPTION LOSS	dB	7		
19. TOTAL FIXED LOSSES	d₿	3.3		3.3
20. TOTAL LOSSES (PATH AND FIXED)	₫B		132.3	
218 ANTENNA DIAMETER	Feet	8.0		8.0
22. ANTENNA TYPE		GRID		GRID
23. ANTENNA GAIN	d8i	31.3		31.3
24. TOTAL ANTENNA GAINS	₫₿		62.7	
25. NET SYSTEM LOSS	d8		69.6	
REFACIO EQUIPMENT TYPE AND CAPACITY			DIGITAL 96	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD	dBm		-83.0	
29. NET SYSTEM GAIN	dB		115.0	
30. MEDIAN RECEIVED POWER	dBm		-37.6	
30. FLAT FADE MARGIN 31. DISPERSIVE F.M. (DIG. ONLY)			45.4 51.0	
32. COMPOSITE FADE MARGIN	dB dB		44.3	
WEIGHTED RAYLEIGH PROPAGATION RE		OR ATMOSPHE		Н
TERRAIN/CLIMATE FACTOR	0.25 TO 6			6.0
MEAN ANNUAL TEMPERATURE	Deg F			68.0
DIVERSITY SPACING	Feet			60.0
Y** * * * * * * * * * * * * * * * * * *				
NON-DIVERSITY OUTAGE TIME	Sec/yr			38.8
NON-DIVERSITY AVAILABILITY	Percent			99.99988
SPACE DIVERSITY IMPROV. FACTOR	Decimal			864.2
SPACE DIVERSITY DUTAGE TIME	Sec/yr			0.0
SPACE DIVERSITY AVAILABILITY	Percent			100.00000
BEIL SHORT HAUL OR EXTIVE	<u> </u>			00.
BCTT Guara water Controller	Sec/yr			96.0

MICROWAVE RADIO PATH CA	ALCULATIC	N SPREADSHE	ΕT	30-Jul-92
PROJECT NAME	•	?		
ENGINEER	•	?	*	
FHEQUENCY (GHz)		6.70		
1. SITE NAME	 -	?	L	?
3. LATITUDE, North,	Degrees	7	· · · · · · · · · · · · · · · · · · ·	?
	Minutes	7		?
	Seconds	?		?
4. LONGITUDE, West,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
5. SITE ELEVATION. AMSL	Feet	?		?
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7. PATH LENGTH	Miles		15.0	
8. PATH ATTENUATION	dB	?	136.6	
10. TOWER TYPE 11. ANTENNA HEIGHT,AGL	Feet	130		? 130
12. TRANSMISSION LINE LENGTH	Feet	140		130
13. TRANS. LINE TYPE	Feet	EW63		EW63
14. TRANS, LINE LOSS	dB/100'	1.40		1,40
15. TRANSMISSION LINE LOSS	d₿	2.0		2.0
16. MISCELLANEOUS LOSSES	dB	0.5		0.5
17. PROTECTED TERMINAL LOSS	dB	?		?
18. DIVERSITY RECEPTION LOSS	dB	?		?
19. TOTAL FIXED LOSSES	d₿	2.5		2.5
20. TOTAL LOSSES(PATH AND FIXED)	₫B		141.6	
21 ANTENNA DIAMETER	Feet	8.0		8.0
22. ANTENNA TYPE		SOLID		SOUD
23. ANTENNA GAIN	dBi	42.3	94.6	42.3
24. TOTAL ANTENNA GAINS 25. NET SYSTEM LOSS	d8		84.6 57.0	
28. FARIOTENIUS (COS)	0.5		DIGITAL 96	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD	dBm		-83.0	
29. NET SYSTEM GAIN	dB		115.0	
30. MEDIAN RECEIVED POWER	dBm		-25.0	
30. FLAT FADE MARGIN	d 8		58.0	
31. DISPERSIVE F.M. (DIG. ONLY)	dB		51.0	
32. COMPOSITE FADE MARGIN	d₿		50.2	
WEIGHTED RAYLEIGH PROPAGATION REI	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	1
	0.25 TO 6			6.0
TERHAIN/CLIMATE FACTOR	0.20 10 6			68.0
MEAN ANNUAL TEMPERATURE	0.25 10 6 Deg F		<u> </u>	
				30.0
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING	Deg F Feet			30.0
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-ERVERSITY OUT AGE TIME	Deg F Feet Sec/yr			30.0 35.3
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING	Deg F Feet			30.0 35.3
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-DIVERSITY OUTAGE TIME NON-DIVERSITY AVAILABILITY	Deg F Feet Sec/yr Percent			30.0 35.3 99.99969
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-DIVERSITY OUTAGETIME NON-DIVERSITY AVAILABILITY SPACE DIVERSITY IMPROV. FACTOR	Deg F Feet Sec/yr Percent			30.0 35.3 99.99969 2953.7
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING MON-DRIVERSITY OUTAGE TIME NON-DIVERSITY AVAILABILITY	Deg F Feet Sec/yr Percent			30.0 35.3 99.99969
MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-DIVERSITY OUTAGETIME NON-DIVERSITY AVAILABILITY SPACE DIVERSITY IMPROV. FACTOR SPACE DIVERSITY DUTAGE TIME	Deg F Feet Sec/yr Percent Decimal Sec/yr			35.3 99.99969 2953.7 0.0

1 1881 1 11 1 1

MICROWAVE RADIO PATH C	ALCULATIO	N SPREADSHEE	T	30-Jul-9
PROJECT NAME		?		
NGINEER	-	?	į	
REQUENCY (GHz)		1.90		
1. SITE NAME	 	?		<u> </u>
3. LATITUDE. North,	Degrees	?		
	Minutes	?		
	Seconds	?		
4. LONGITUDE, West,	Degrees	?		
	Minutes	?	· · · · · · · · · · · · · · · · · · ·	
	Seconds	?		
5. SITE ELEVATION, AMSL	Feet	?		
6. AZIMUTH FROM NORTH	Degrees	0.0		0.
Z PATHLENGTH	Miles		25.0	
B. PATH ATTENUATION G. TOWER TYPE	dB	?	130.1	
1. ANTENNA HEIGHT.AGL	Feet	210		21
2. TRANSMISSION LINE LENGTH	Feet	220		22
3. TRANS. LINE TYPE	1 991	1 5/8" FOAM		1 5/8" FOA
4. TRANS, LINE LOSS	d9/100'	1.25		1.2
5. TRANSMISSION LINE LOSS	dB	2.8	***************************************	2.
6. MISCELLANEOUS LOSSES	d₿	0.5		O.
7. PROTECTED TERMINAL LOSS	dB	?		
8. DIVERSITY RECEPTION LOSS	d₿	?		
9. TOTAL FIXED LOSSES	d₿	3.3		3.
0. TOTAL LOSSES(PATH AND FIXED)	d₿		136.6	
ANTENNA DIAMETER	Feet	12.0		12.
2. ANTENNA TYPE		GRID		GRI
3. ANTENNA GAIN	dBi	34.9		34.
4. TOTAL ANTENNA GAINS	dB		69.7	
5. NET SYSTEM LOSS	<u>dB</u>		66.9	
BERADICAEDLURMENT DYPE AND CAPACITY			DIGITAL 96	
7. MINIMUM TRANSMITTER POWER	dBm		32.0	
8. RECEIVER THRESHOLD 9. NET SYSTEM GAIN	dBm dB		-83.0 115.0	
O. MEDIAN RECEIVED POWER	dBm		-34.9	
O. FLAT FADE MARGIN	dB		48.1	
1. DISPERSIVE F.M. (DIG, ONLY)	dB		51.0	
2. COMPOSITE FADE MARGIN	dB		46.3	
WEIGHTED RAYLEIGH PROPAGATION RE	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	Н
\$2007/01/21/04/01/2020/2020/2020	0.25 TO 6			6.
MEAN ANNUAL TEMPERATURE	Deg F			68.
DIVERSITY SPACING	Feet			60.
	0			444
NON-DIVERSITY OUTAGE TIME NON-DIVERSITY AVAILABILITY	Sec/yr			114. 99.9996
HOH-DIVERSILI AVAILABILIT	Percent			33.3330
SPACE DIVERSITY IMPROV. FACTOR	Decimal			815.
SPACE DIVERSITY OUTAGE TIME	Sec/yr		· · · · · · · · · · · · · · · · · · ·	0.
SPACE DIVERSITY AVAILABILITY	Percent			100.0000
	1			

NATIONAL TELECOMMUNICATION	VS AND INF	ORMATION ADI	MINISTRATION	
US DEPARTMENT (MICROWAVE RADIO PATH C				20 1.4 00
MICHOWAVE RADIO PATH C	ALCULATIC	DN SPREADSRE	= !	30-Jul-92
PROJECT NAME	-	7		
ENGINEER	:	?	•	
FREQUENCY (GHz)	-	6.70		
1. SITE NAME		7		?
3. LATITUDE, North,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
4. LONGITUDE, West,	Degrees	?		?
	Minutes	?		3
5. SITE ELEVATION, AMSL	Seconds Feet	?		?
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
PATH ENGIH	Miles	1	25.0	V.0
8. PATH ATTENUATION	dB		141.1	
10. TOWER TYPE		?		?
11. ANTENNA HEIGHT,AGL	Feet	210		210
12. TRANSMISSION LINE LENGTH	Feet	220		220
13. TRANS. LINE TYPE 14. TRANS. LINE LOSS	d8/100°	EW63		EW63
15. TRANSMISSION LINE LOSS	dB	3.1		3.1
16. MISCELLANEOUS LOSSES	dB	0.5		0.5
17. PROTECTED TERMINAL LOSS	d₿	?		?
18. DIVERSITY RECEPTION LOSS	dB	?		?
19. TOTAL FIXED LOSSES	d₿	3.6		3.6
20. TOTAL LOSSES(PATH AND FIXED)	dB		148.2	10.0
21, ANTENNA DIAMETER 22. ANTENNA TYPE	Feet	SOLID		12.0 SOLID
23. ANTENNA GAIN	dBi	45.8		45.8
24. TOTAL ANTENNA GAINS	d₿		91.6	
25, NET SYSTEM LOSS	d8		56.6	
zonemiento de la manta de la compania del compania de la compania de la compania del compania de la compania de la compania de la compania del com			DIGITAL 96	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD	dBm		-83.0	
29. NET SYSTEM GAIN 30. MEDIAN RECEIVED POWER	dBm		115.0 -24.6	
30. FLAT FADE MARGIN	dB		58.4	
31. DISPERSIVE F.M. (DIG. ONLY)	d₿		51.0	
32. COMPOSITE FADE MARGIN	d₿		50.3	
WEIGHTED RAYLEIGH PROPAGATION RE	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	H
STEERIAIN/GUMATE: PACTOR	0.25 TO 6			6.00
MEAN ANNUAL TEMPERATURE	Deg F			68.0
DIVERSITY SPACING	Feet			30.0
**************************************	6			
NON-DIVERSITY OUTAGE TIME NON-DIVERSITY AVAILABILITY	Sec/yr Percent			160.0 99.99949
MOIN-DIVERBILL MANIFABIREL	rercent			33.38343
SPACE DIVERSITY IMPROV. FACTOR	Decimal			1796,4
SPACE DIVERSITY OUTAGE TIME	Sec/yr			0.1
SPACE DIVERSITY AVAILABILITY	Percent			100.00000
	Crt			
SEL SHORTHAULUSJEDTIVE	Sec/yr			160.0

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION US DEPARTMENT of COMMERCE					
MICROWAVE RADIO PATH C		_	ET	30-Jul-92	
PROJECT NAME		7			
ENGINEER		7	•		
HEGHEN OF CHE		1.90			
1. SITE NAME		?		?	
3. LATITUDE, North,	Degrees	7		?	
	Minutes	?		?	
	Seconds	?		?	
4. LONGITUDE, West.	Degrees	?		?	
	Minutes	?		?	
	Seconds	?		?	
5. SITE ELEVATION, AMSL	Feet	?		?	
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0	
/ PATH (ENGIH	Miles		35.0		
8. PATH ATTENUATION	dB		133.1		
10. TOWER TYPE		?		?	
11. ANTENNA HEIGHT,AGL	Feet	350		350	
12. TRANSMISSION LINE LENGTH	Feet	360		360	
13. TRANS. LINE TYPE	181185	1 5/8" FOAM		1 5/8" FOAM	
14. TRANS. LINE LOSS	dB/100′	1.25		1.25	
15. TRANSMISSION LINE LOSS	dB	4.5		4.5	
16. MISCELLANEOUS LOSSES	dB	0.5		0.5	
17. PROTECTED TERMINAL LOSS 18. DIVERSITY RECEPTION LOSS	dB dB	?		7	
19. TOTAL FIXED LOSSES	dB	5.0		5.0	
20. TOTAL FIXED LOSSES 20. TOTAL LOSSES(PATH AND FIXED)	dB	3.0	143.1	3.0	
ANTENNA DIAMETER	Feet	8.0	740.1	8.0	
22. ANTENNA TYPE	**	GRID		GRID	
23. ANTENNA GAIN	dBi	31.3		31.3	
24. TOTAL ANTENNA GAINS	dB		62.7		
25. NET SYSTEM LOSS	₫₿		80.4		
20 GA HORENDENI SYPE AND CAPACITY			DIGITAL 96		
27. MINIMUM TRANSMITTER POWER	dBm		32.0		
28. RECEIVER THRESHOLD	dBm		-83.0		
29. NET SYSTEM GAIN	d8		115.0		
30. MEDIAN RECEIVED POWER	dBm		-48.4		
30. FLAT FADE MARGIN	d₿		34.6		
31. DISPERSIVE F.M. (DIG. ONLY)	dB		51.0		
32. COMPOSITE FADE MARGIN	dB		34.5		
WEIGHTED RAYLEIGH PROPAGATION RE	ELIABILITY F	OR ATMOSPHE	RIC MULTIPATI	H	
REPRESENTATION OF THE PROPERTY	0.25 TO 6			6.0	
MEAN ANNUAL TEMPERATURE	Deg F			68.0	
DIVERSITY SPACING	Feet			60.0	
NONCOLVERSITY OF TRACE TIME	Sec/yr			4720.5	
NON-DIVERSITY AVAILABILITY	Percent			99.98503	
TOTAL DITT ATABABILITY	: elcatif			33.36303	
SPACE DIVERSITY IMPROV. FACTOR	Decimal			38.7	
SIPKOE OKIERSION ONINASENIME	Sec/yr			121.9	
SPACE DIVERSITY AVAILABILITY	Percent			99.99961	
BEIS SHORT HAU DESENTIVE	Sec/yr			224.0	

US DEPARTMENT MICROWAVE RADIO PATH O			ΞT	30-Jul-92
PROJECT NAME	_	?		
ENGINEER	_	?		
FREQUENCY (GH2)	*	6.70	·	,
1. SITE NAME	+	?		?
3. LATITUDE, North,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
4. LONGITUDE, West,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
5. SITE ELEVATION, AMSL	Feet	?		7
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7. PATHEENGEN	Miles		35.0	
8. PATH ATTENUATION	dB dB		144.0	
10. TOWER TYPE	+	?		?
11. ANTENNA HEIGHT, AGL	Feet	350		350
12. TRANSMISSION LINE LENGTH	Feet	360 EW63		360 EW63
13. TRANS. LINE TYPE 14. TRANS. LINE LOSS	dB/100'	1.40		
15. TRANSMISSION LINE LOSS		5.0		1,40 5.0
16. MISCELLANEOUS LOSSES	dB dB	0.5		0.5
17. PROTECTED TERMINAL LOSS	dB	7		9.9
18. DIVERSITY RECEPTION LOSS	dB	7		?
19. TOTAL FIXED LOSSES	dB	5.5		5.5
20. TOTAL LOSSES (PATH AND FIXED)	d₿		155.1	
21 ANTENNA DIAMETER	Feet	8.0		8.0
22. ANTENNA TYPE		SOLID		SOUD
23. ANTENNA GAIN	dBi	42.3		42.3
24. TOTAL ANTENNA GAINS	dB		84.6	
25. NET SYSTEM LOSS	dB		70.5	
CHECKE ESTELEN DE VEZANO SAVASO (S			DIGITAL 96	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD	dBm		-83.0	
29. NET SYSTEM GAIN	dB		115.0	
30. MEDIAN RECEIVED POWER	dBm		-38.5	
30. FLAT FADE MARGIN	dB		44.5	
31. DISPERSIVE F.M. (DIG. ONLY) 32. COMPOSITE FADE MARGIN	dB dB		51.0 43.6	
WEIGHTED RAYLEIGH PROPAGATION RE		OR ATMOSPHE		-
TETTAIN/GENALET ACTOR	0.25 TO 6			6.0
MEAN ANNUAL TEMPERATURE	Deg F			68.0
DIVERSITY SPACING	Feet			30.0
· · · · · · · · · · · · · · · · · · ·				
NON-DIVERSITY OUTAGE TIME	Sec/yr			2052.3
NON-DIVERSITY AVAILABILITY	Percent		7	99.99349
SPACE DIVERSITY IMPROV. FACTOR	Decimal			276.9
SPACE DIVERSITY DUTAGE TIME	Sec/yr			7.4
SPACE DIVERSITY AVAILABILITY	Percent			99.99998
BELL SHORT HAUL CRUEOTIVE	Sec/yr			224.0

PROJECT NAME — ? ENGINEER — ? FHEGBENCY (GH2) 1.90 1. SITE NAME	2.00
PRECIDENCY (CHE) 1.90 1.	? ? ? ? ? 0.0 130 140 OAM 2.00
1. SITE NAME 2. LATITUDE, North, Degrees ? 3. LATITUDE, North, Degrees ? 4. LONGITUDE, West, Degrees ? 4. LONGITUDE, West, Degrees ? 5. SITE ELEVATION, AMSL Feet ? 6. AZIMUTH FROM NORTH Degrees 0.0 7. PATH LENGTH Miles 15.0 8. PATH ATTENUATION DEGREES 10.0 10. TOWER TYPE 7 11. ANTENNA HEIGHT, AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM	? ? ? ? ? 0.0 130 140 OAM 2.00
1. SITE NAME 3. LATITUDE, North, Degrees 7. Minutes 7. Seconds 7. 4. LONGITUDE, West, Degrees 7. Minutes 7. Minutes 7. Seconds 7. Minutes 7. Seconds 7. Se	? ? ? ? ? 0.0 130 140 OAM 2.00
3. LATITUDE, North, Degrees ?	? ? ? ? ? 0.0 130 140 OAM 2.00
Minutes ?	? ? ? ? 0.0 130 140 OAM 2.00
Minutes ?	? ? ? ? 0.0 ? 130 140 OAM 2.00
4. LONGITUDE, West, Degrees ? Minutes ? Seconds ? 5. SITE ELEVATION, AMSL Feet ? 6. AZIMUTH FROM NORTH Degrees 0.0 7. PATHEENGTH Miles 15.0 8. PATH ATTENUATION dB 125.7 10. TOWER TYPE ? 11. ANTENNA HEIGHT, AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FOA	? ? ? 0.0 ? 130 140 OAM 2.00
Minutes 7	? ? 0.0 ? 130 140 OAM 2.00
Seconds 7	? 0.0 ? 130 140 OAM 2.00
5. SITE ELEVATION, AMSL Feet ? 6. AZIMUTH FROM NORTH Degrees 0.0 7. PATHLENGTH Miles 15.0 8. PATH ATTENUATION dB 125.7 10. TOWER TYPE ? 11. ANTENNA HEIGHT, AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA GAIN dB 31.3 24. TOTAL ANTENNA GAINS dB 62.7	? 0.0 ? 130 140 OAM 2.00
6. AZIMUTH FROM NORTH Degrees 0.0 7. PATHLENGTH Miles 15.0 8. PATH ATTENUATION dB 125.7 10. TOWER TYPE ? 11. ANTENNA HEIGHT, AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100' 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	? 130 140 OAM 2.00
2 PATHLENGTH	? 130 140 OAM 2.00
8. PATH ATTENUATION dB 125.7 10. TOWER TYPE ? 11. ANTENNA HEIGHT,AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	130 140 OAM 2.00
10. TOWER TYPE	130 140 OAM 2.00
11. ANTENNA HEIGHT, AGL Feet 130 12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	130 140 OAM 2.00
12. TRANSMISSION LINE LENGTH Feet 140 13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	140 OAM 2.00
13. TRANS, LINE TYPE 7/8" FOAM 7/8" FO 14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	2.00
14. TRANS, LINE LOSS dB/100" 2.00 15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	2.00
15. TRANSMISSION LINE LOSS dB 2.8 16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	
16. MISCELLANEOUS LOSSES dB 0.5 17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	
17. PROTECTED TERMINAL LOSS dB ? 18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	2.8
18. DIVERSITY RECEPTION LOSS dB ? 19. TOTAL FIXED LOSSES dB 3.3 20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	0.5
19. TOTAL FIXED LOSSES	?
20. TOTAL LOSSES(PATH AND FIXED) dB 132.3 21. ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	?
21) ANTENNA DIAMETER Feet 8.0 22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	3.3
22. ANTENNA TYPE GRID 23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	
23. ANTENNA GAIN dBi 31.3 24. TOTAL ANTENNA GAINS dB 62.7	8.0
24. TOTAL ANTENNA GAINS dB 62.7	GRID
	31.3
25. NET SYSTEM LOSS dB 69.6	
28 SAND EQUIPMENT BY PE AND CAPACITY DIGITAL 672	
27. MINIMUM TRANSMITTER POWER dBm 30.0	
28. RECEIVER THRESHOLD dBm -69.0	
29. NET SYSTEM GAIN	
30. MEDIAN RECEIVED POWER dBm 39.6	
30. FLAT FADE MARGIN	
31. DISPERSIVE F.M. (DIG. ONLY) dB 51.0	
32. COMPOSITE FADE MARGIN dB 29.3	
WEIGHTED RAYLEIGH PROPAGATION RELIABILITY FOR ATMOSPHERIC MULTIPATH	
*IEFEAN/CLIMATE FACTOR #10.25 TO 6	6.0
MEAN ANNUAL TEMPERATURE Deg F	68.0
DIVERSITY SPACING Feet	60.0
	000 /
	222.4
NON-DIVERSITY AVAILABILITY Percent 99.8	99612
SPACE DIVERSITY IMPROV. FACTOR Decimal	
SPACE DIVERSITY OUT AGE TIME Sec/yr	27.5
	44.5
BEST SHORT HAULOSJECTIVE Sec/yr	

MICROWAVE RADIO PATH (CALCULATIO	ON SPREADSHE	ET	30-Jul-9;
PROJECT NAME		. ,		
ENGINEER		7	_	
FREQUENCY (GHz)		6.70		
1. SITE NAME		?		
3. LATITUDE, North,	Degrees	?		
	Minutes	?		
	Seconds	?		
4. LONGITUDE, West,	Degrees	?		
	Minutes	?		
	Seconds	?		
5. SITE ELEVATION, AMSL	Feet	?		
6. AZIMUTH FROM NORTH	Degrees	0.0		0.
7 PATHLENGTH	Miles		15.0	
8. PATH ATTENUATION	dB		136.6	
10. TOWER TYPE		?		
11. ANTENNA HEIGHT,AGL	Feet	130	ļ	13
12. TRANSMISSION LINE LENGTH	Feet	140		14
13. TRANS. LINE TYPE	1011000	EW63		EW6
14. TRANS. LINE LOSS	dB/100°	1.40		1.4
15. TRANSMISSION LINE LOSS	dB	2.0		2.
16. MISCELLANEOUS LOSSES	dB	0.5		0.
17. PROTECTED TERMINAL LOSS		?		
18. DIVERSITY RECEPTION LOSS	dB	<u> </u>		
19. TOTAL FIXED LOSSES 20. TOTAL LOSSES(PATH AND FIXED)	dB	2.5	1416	2.
ZI, ANTENNA DIAMETER	dB Feet	1 8.0	141.6	8.
22. ANTENNA TYPE	S FOOL	SOUD		SOLI
23. ANTENNA GAIN	dBi	42.3		42.
24. TOTAL ANTENNA GAINS	dB	1	84.6	7
25. NET SYSTEM LOSS	dB		57.0	
26. HADIĞ EQUEMENT TYPE AND CAPAÇTIY.			DIGITAL 672	
27. MINIMUM TRANSMITTER POWER	dBm		30.0	
28. RECEIVER THRESHOLD	dBm		-69.0	
29. NET SYSTEM GAIN	₫B		99.0	
30. MEDIAN RECEIVED POWER	dBm		-27.0	,
30. FLAT FADE MARGIN	dB		42.0	
31. DISPERSIVE F.M. (DIG. ONLY)	d₿		42.0	
2. COMPOSITE FADE MARGIN	d₿		39.0	
WEIGHTED RAYLEIGH PROPAGATION RE	ELIABILITY F	OR ATMOSPHE	RIC MULTIPATI	4
NEST ZANAKORMANTĖ SAGROJE	NAME TO S			6.
MEAN ANNUAL TEMPERATURE	Deg F	 		68.
DIVERSITY SPACING	Feet			30.
NON-DIVERSITY OUT/AGE TIME	Sec/yr			467.
NON-DIVERSITY AVAILABILITY	Percent			99.9985
SPACE DIVERSITY IMPROV. FACTOR	Decimal			223.
SPACE DIVERSITY DUTAGE TIME	Seciyi			2.
SPACE DIVERSITY AVAILABILITY	Percent			99.9999
BELL SHORT HAUL DEJECTIVE 💮 🐭 🐭	Sec/yr	1		96

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION US DEPARTMENT of COMMERCE					
MICROWAVE RADIO PATH C		_	ET	30-Jul-92	
ODO JEST NAME		4			
PROJECT NAME	_	?			
FIEODENOS (GES)		1.90			
4 STE NAME					
1. SITE NAME	Danne	?		?	
3. LATITUDE, North,	Degrees Minutes	7		?	
	Seconds	7		?	
4. LONGITUDE, West,	Degrees	7		?	
	Minutes	?		?	
	Seconds	?		?	
5. SITE ELEVATION, AMSL	Feet	?		?	
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0	
7. PATHÆNGTH	Miles		25.0		
8. PATH ATTENUATION	d₿		130.1		
10. TOWER TYPE		?		?	
11. ANTENNA HEIGHT,AGL	Feet	210		210	
12. TRANSMISSION LINE LENGTH	Feet	220		220	
13. TRANS. LINE TYPE	121122	1 5/8" FOAM		1 5/8" FOAM	
14. TRANS. UNE LOSS	dB/100'	1.25	<u> </u>	1.25	
15. TRANSMISSION LINE LOSS	dB	2.8		2.8	
16. MISCELLANEOUS LOSSES	dB	0.5		0.5	
17. PROTECTED TERMINAL LOSS	dB	?		?	
18. DIVERSITY RECEPTION LOSS 19. TOTAL FIXED LOSSES	dB dB	3.3		3.3	
20. TOTAL FIXED LOSSES 20. TOTAL LOSSES (PATH AND FIXED)	dB	3.3	136.6	3.3	
ZIMANTENNA DIAMETER	Feet	12.0	130.8	12.0	
22. ANTENNA TYPE	1 861	GRID		GRID	
23. ANTENNA GAIN	dBi	34.9		34.9	
24. TOTAL ANTENNA GAINS	d₿		69.7	<u> </u>	
25. NET SYSTEM LOSS	dB		66.9		
26: RACHO EDURMENT TYPE AND CAPACITY			DIGITAL 672		
27. MINIMUM TRANSMITTER POWER	dBm		30.0		
28. RECEIVER THRESHOLD	dBm		-69.0		
29. NET SYSTEM GAIN	d₿		99.0		
30. MEDIAN RECEIVED POWER	dBm		-36.9		
30. FLAT FADE MARGIN	d₿		32.1		
31. DISPERSIVE F.M. (DIG. ONLY)	dB		42.0		
32. COMPOSITE FADE MARGIN	dB		31.7	· · · · · · · · · · · · · · · · · · ·	
WEIGHTED RAYLEIGH PROPAGATION REI	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	н	
CERTAIN/CEMACERACIOE	0.25 TO 6			6.0	
MEAN ANNUAL TEMPERATURE	Deg F			68.0	
DIVERSITY SPACING	Feet			60.0	
MON-DEVERSITY OUTAGETIME	Sec/yr		·	3321.0	
NON-DIVERSITY AVAILABILITY	Percent			99.98947	
- CONTROLL VANIMBIRE	r tri Gerit			33.3034/	
SPACE DIVERSITY IMPROV. FACTOR	Decimal			28.1	
GPACE DIVERSITY DUTAGE TIME	Sec/yr			118.3	
SPACE DIVERSITY AVAILABILITY	Percent			99.99962	
REELISMORT HALP CRUECTIVE	Sec/yr			160.0	
				100.0	

NATIONAL TELECOMMUNICATION			MINISTRATION	
US DEPARTMENT O MICROWAVE RADIO PATH C			ET	30-Jul-92
PROJECT NAME	_	?		
ENGINEER	•	;	-	
FREQUENCY (GHz)		6.70		
1. SITE NAME	 	7		?
3. LATITUDE, North,	Degrees	+ ÷		7
0. 5411052, 10111,	Minutes	1 7	 	?
	Seconds	7		?
4. LONGITUDE, West,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
5. SITE ELEVATION, AMSL	Feet	?		?
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7. PATH LENGTH	Miles		25.0	
8. PATH ATTENUATION	dB		141.1	
10. TOWER TYPE		?		?
11. ANTENNA HEIGHT, AGL	Feet	210		210
12. TRANSMISSION LINE LENGTH	Feet	220		220
13. TRANS. LINE TYPE	10/400	EW63	ļ ————	EW63
14. TRANS. LINE LOSS 15. TRANSMISSION LINE LOSS	dB/100°	1.40		1.40
16. MISCELLANEOUS LOSSES	dB dB	3.1		3.1
17. PROTECTED TERMINAL LOSS	dB	0.5		0.5
18. DIVERSITY RECEPTION LOSS	dB	7		?
19. TOTAL FIXED LOSSES	dB	3.6	1	3.6
20. TOTAL LOSSES(PATH AND FIXED)	dB		148.2	0.0
21 ANTENNA DIAMETER	Feet	8.0		8.0
22. ANTENNA TYPE		SOUD		SOLID
23. ANTENNA GAIN	dBi	42.3		42.3
24. TOTAL ANTÈNNA GAINS	dB		84.6	
25. NET SYSTEM LOSS	d₿		63.7	
entrologous mentracy de anatogaractiv			DIGITAL 672	
27. MINIMUM TRANSMITTER POWER	d8m		30.0	
28. RECEIVER THRESHOLD	dBm		-69.0	
29. NET SYSTEM GAIN	₫B		99.0	
30. MEDIAN RECEIVED POWER	dBm		-33.7	
30. FLAT FADE MARGIN	dB		35.3	
31. DISPERSIVE F.M. (DIG. ONLY) 32. COMPOSITE FADE MARGIN	dB dB		42.0 34.5	
WEIGHTED RAYLEIGH PROPAGATION REL		OR ATMOSPHE		.
MERHANICUMATE FACTOR	0.25 TO 6			6.0
MEAN ANNUAL TEMPERATURE	Deg F			68.0
DIVERSITY SPACING	Feet			30.0
INDN-DIVERSITY OUTAGE TIME	Seeke			6120.1
NON-DIVERSITY AVAILABILITY	Sec/yr Percent			99.98059
SPACE DIVERSITY IMPROV. FACTOR	Decimal			47.4
SPACE DIVERSITY IMPHOVE FACTOR	Sec/vr			129.2
SPACE DIVERSITY AVAILABILITY	Percent			99.99959
BELL SHORT HAUL OBJECTIVE	Sector			160.0
BELL SHORT HAUL OBJECTIVE	Sec/yr			160.0

MICROWAVE RADIO PATH C	ALCULATIO	N SPREADSHE	ET	30-Jul-92
PROJECT NAME	-	7		
ENGINEER	-	?		
HEQUENCY (GHz)		1.90		_
1. SITE NAME		?		
3. LATITUDE, North,	Degrees	?		
	Minutes	?	<u> </u>	
	Seconds	?		
4. LONGITUDE, West,	Degrees	?		
	Minutes	?		
	Seconds	?		
5. SITE ELEVATION, AMSL	Feet	?		
6. AZIMUTH FROM NORTH	Degrees	0.0		0.
7:PATHLENGTH	Miles		30.0	
8. PATH ATTENUATION	dB	<u></u>	131.7	
10. TOWER TYPE		?		
11. ANTENNA HEIGHT.AGL	Feet	300		30
12. TRANSMISSION LINE LENGTH	Feet	310		31
13. TRANS. LINE TYPE 14. TRANS. LINE LOSS	4D (4 00)	1 5/8" FOAM		1 5/8° FOA
14. TRANS. LINE LOSS 15. TRANSMISSION LINE LOSS	dB/100°	1.25		1.2
16. MISCELLANEOUS LOSSES	dB dB	3.9		3.
17. PROTECTED TERMINAL LOSS	dB	7		C.
18. DIVERSITY RECEPTION LOSS	dB	7		
19. TOTAL FIXED LOSSES	dB	4.4		4.
20. TOTAL LOSSES(PATH AND FIXED)	dB	7.7	140.5	٠,
III, ANTENNA DIAMETER	Feet	12.0	7.0.0	12.
22. ANTENNA TYPE		GRID		GRII
23. ANTENNA GAIN	dBi	34.9		34.
24. TOTAL ANTENNA GAINS	₫В		69.7	
25. NET SYSTEM LOSS	dB		70.8	
E FAUIS EURHMENT PERM CATACITY			DIGITAL 672	
7. MINIMUM TRANSMITTER POWER	dBm		30.0	
28. RECEIVER THRESHOLD	₫₿m		-69.0	
29. NET SYSTEM GAIN	d₿		99.0	
0. MEDIAN RECEIVED POWER	dBm		-40.8	
0. FLAT FADE MARGIN	dB		28.2	
1. DISPERSIVE F.M. (DIG. ONLY)	dB		42.0	
2. COMPOSITE FADE MARGIN	dB		28.1	
WEIGHTED RAYLEIGH PROPAGATION RE	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	4
S were to U (S 7 (A (2)) & S (A (A (A (A (A (A (A (A (A (IN DE VOIC			
MEAN ANNUAL TEMPERATURE	0.25 TO 6			6.
DIVERSITY SPACING	Feet			68. 60.
NONDIVERSITY OUTAGE TIME	Sec/yr			13120.
NON-DIVERSITY AVAILABILITY	Percent			99.9584
SPACE DIVERSITY IMPROV. FACTOR	Decimal			10.
SPACE DIVERSITY DUTTAGE TIME	Sec/yr			1281.
SPACE DIVERSITY AVAILABILITY	Percent			99.9959
EEU SHORI HAULGESEONVE	Sec/yr	1		192.

MICROWAVE RADIO PATH C	of COMMER CALCULATIO		ET	30-Jul-92
PROJECT NAME	_	?		
ENGINEER		?	-	
25E@BinNo%(GI\$5)		6.70		
1. SITE NAME	- 	?		?
3. LATITUDE, North,	Degrees	?		?
	Minutes Seconds	7	 	
4. LONGITUDE, West,	Degrees	7		 ?
T. LOTTON TOOL, WOOL	Minutes	 		?
	Seconds	7		7
5. SITÉ ELEVATION, AMSL	Feet	?		?
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7 PATE LENGTH	Miles		30.0	
8. PATH ATTENUATION	dB		142.7	
10. TOWER TYPE		?	ļ <u> </u>	?
11. ANTENNA HEIGHT,AGL	Feet	300		300
12. TRANSMISSION LINE LENGTH	Feet	310		310
13. TRANS. LINE TYPE	15:555	EW63		EW63
14. TRANS. LINE LOSS	dB/100'	1.40		1.40
15. TRANSMISSION LINE LOSS	dB	4.3		4.3
16. MISCELLANEOUS LOSSES 17. PROTECTED TERMINAL LOSS	dB	0.5		0.5 ?
18. DIVERSITY RECEPTION LOSS	dB dB			<u>:</u> ?
19. TOTAL FIXED LOSSES	dB	4.8		4.8
20. TOTAL LOSSES (PATH AND FIXED)	dB	7.0	152.3	4.0
21 ANGENNA DIAMETER	Feet	12.0		12.0
22. ANTENNA TYPE		SOLID		SOLID
23. ANTENNA GAIN	dBi	45.8		45.8
24. TOTAL ANTENNA GAINS	dB		91.6	
25. NE T SYS TEM LOSS	dB		60.7	
addian i gadhaman yayanda aasaa iyo			DIGITAL 672	
27. MINIMUM TRANSMITTER POWER	d8m		30.0	
28. RECEIVER THRESHOLD	dBm		-69.0	
29. NET SYSTEM GAIN	dB	ļ	99.0	
30. MEDIAN RECEIVED POWER	dBm		-30.7	
30. FLAT FADE MARGIN	dB	ļ	38.3	
31. DISPERSIVE F.M. (DIG. ONLY)	dB dB		42.0 36.7	
		1	00.7	
32. COMPOSITE FADE MARGIN WEIGHTED RAYLEIGH PROPAGATION RE			RIC MULTIPATI	
WEIGHTED RAYLEIGH PROPAGATION RE	0.25 TO 6		RIC MULTIPATI	6.0
WEIGHTED RAYLEIGH PROPAGATION RETERMENT OF THE PROPAGATION RETERMENT OF THE PROPAGATION REAN ANNUAL TEMPERATURE	0.25 TO 6 Deg F		RIC MULTIPATH	6.0 68.0
WEIGHTED RAYLEIGH PROPAGATION RE	0.25 TO 6		RIC MULTIPATH	6.0 68.0
WEIGHTED RAYLEIGH PROPAGATION RETERMINICALMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING	0.25 TO 6 Deg F Feet		RIC MULTIPATH	6.0 68.0 30.0
WEIGHTED RAYLEIGH PROPAGATION RETERMIN/CLIMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NONE IVERSITY OUTAGE TIME	0.25 TO 6 Deg F Feet Sec/yr		RIC MULTIPATE	6.0 68.0 30.0 6294.8
WEIGHTED RAYLEIGH PROPAGATION RETERMINICEIMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING	0.25 TO 6 Deg F Feet		RIC MULTIPATE	6.0 68.0 30.0 6294.8
WEIGHTED RAYLEIGH PROPAGATION RETERMINICUMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-EVERSITY OFFICIAL SETTIME NON-DIVERSITY AVAILABILITY	0.25 TO 6 Deg F Feet Sec/yr Percent		RIC MULTIPATE	6.0 68.0 30.0 6294.8 99.98004
WEIGHTED RAYLEIGH PROPAGATION RETURN TERM IN/CLIMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NONE EVERSITY OF TAGE TIME NON-DIVERSITY AVAILABILITY SPACE DIVERSITY IMPROV. FACTOR	0.25 TO 6 Deg F Feet Sec/yr Percent		RIC MULTIPATE	6.0 68.0 30.0 6294.8 99.98004
WEIGHTED RAYLEIGH PROPAGATION RETERMINICUMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON EVERSITY OUTAGE TIME NON-DIVERSITY AVAILABILITY SPACE DIVERSITY IMPROV. FACTOR SPACE DIVERSITY DUTAGE TIME	0.25 TO 6 Deg F Feet Sec/yr Percent Decimal Sec/yr		RIC MULTIPATE	6.0 68.0 30.0 6294.8 99.98004 66.3 94.9
WEIGHTED RAYLEIGH PROPAGATION RETURN TERE IN/CEIMATE FACTOR MEAN ANNUAL TEMPERATURE DIVERSITY SPACING NON-TYPERSITY OUT/AGE: TIME NON-DIVERSITY AVAILABILITY SPACE DIVERSITY IMPROV. FACTOR	0.25 TO 6 Deg F Feet Sec/yr Percent		RIC MULTIPATE	6.0 68.0 30.0 6294.8 99.98004

	CALCULATIC	ON SPREADSHE	=1	30-Jul-92
PROJECT NAME		. ?		-
INGINEER		?.		
HERUENO (GHZ)		1.90		
1. SITE NAME		?		
3. LATITUDE, North,	Degrees	7	 	
0, 0 (() 000, () 010, ()	Minutes	?		,
	Seconds	?		· · · · · ·
4. LONGITUDE, West,	Degrees	?		
	Minutes	?		
	Seconds	?		
5. SITE ELEVATION, AMSL	Feet	?		
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7. PATH (ENGTH)	Miles		30.0	
8. PATH ATTENUATION	dB	 	131.7	ļ
O. TOWER TYPE	+ ===	7		100
11. ANTENNA HEIGHT,AGL 12. TRANSMISSION LINE LENGTH	Feet	100	 	100
I3. TRANS. LINE TYPE	- Feet	7/8" FOAM		7/8" FOAM
14. TRANS, LINE LOSS	dB/100°	2.00	 	2.00
5. TRANSMISSION LINE LOSS	dB	2.2		2.2
6. MISCELLANEOUS LOSSES	dB	0.5	l	0.5
7. PROTECTED TERMINAL LOSS	dB	?	i	
8. DIVERSITY RECEPTION LOSS	dB	?		1
9. TOTAL FIXED LOSSES	dB	2.7		2.7
20. TOTAL LOSSES(PATH AND FIXED)	dB		137.1	
II ANTENNA DIAMETER	Feet	8.0		8.0
2. ANTENNA TYPE		GRID		GRIC
3. ANTENNA GAIN	dBi	31.3		31.3
24. TOTAL ANTENNA GAINS	d8		62.7	
25. NET SYSTEM LOSS 16. FADIG EQUIPMENT TYPE AND CAPACITY	dB		74.4 ANALOG 600	
7. MINIMUM TRANSMITTER POWER	dBm		32.0	ļ
8. RECEIVER THRESHOLD	dBm		-80.0	
9. NET SYSTEM GAIN	dB	<u> </u>	112.0	<u> </u>
O. MEDIAN RECEIVED POWER	dBm		-42.4	
D. FLAT FADE MARGIN	dB		37.6	
1. DISPERSIVE F.M. (DIG. ONLY)	dB	i	?	
2. COMPOSITE FADE MARGIN	₫₿		37.6	
WEIGHTED RAYLEIGH PROPAGATION R	ELIABILITY F	OR ATMOSPHE	RIC MULTIPAT	Н
HERRIN/GEIMA (ERFACTOR	0.25 TO 6			0.2
MEAN ANNUAL TEMPERATURE	Deg F			50.0
DIVERSITY SPACING	Feet			60.0
NON-DIVERSITY OUTAGE TIME	Sec/yr			45.3
NON-DIVERSITY AVAILABILITY	Percent			99.99986
CRACE DIVERSITY IMPROV. FACTOR	Decimal			90.9
SPACE DIVERSITY IMPROV. FACTOR				
SPACE DIVERSITY DUTAGE TIME	Sec/yr			0.5
	Sec/yr Percent			100.00000

NATIONAL TELECOMMUNICATION			MINISTRATION	
US DEPARTMENT O MICROWAVE RADIO PATH C			=7	30 1 00
MICHOWAVE RADIO FATH CA	ALCOLA IIC	N SPREADSRE	E1	30-Jul-92
PROJECT NAME	•	?		
ENGINEER	•	?		
PREGRENCY (GRP)		6.70		
4 SEE MANS				
1. SITE NAME 3. LATITUDE, North,	Degrees	?	 	?
S. EXTITODE, Notal,	Minutes	?	ļ	?
	Seconds	?	1	?
4. LONGITUDE, West,	Degrees	?		?
	Minutes	?		?
	Seconds	?		?
5. SITE ELEVATION, AMSL	Feet	?		?
6. AZIMUTH FROM NORTH	Degrees	0.0		0.0
7. PATH LENGTH	Miles		30.0	
8. PATH ATTENUATION	dB		142.7	
10. TOWER TYPE		?		?
11. ANTENNA HEIGHT,AGL	Feet	100		100
12. TRANSMISSION LINE LENGTH	Feet	110		110
13. TRANS. LINE TYPE	10/400	EW63		EW63
14. TRANS. LINE LOSS 15. TRANSMISSION LINE LOSS	d8/100'	1.40		1.40
16. MISCELLANEOUS LOSSES	dB dB	1.5		1.5 0.5
17. PROTECTED TERMINAL LOSS	dB	7		?
18. DIVERSITY RECEPTION LOSS	₫₿			?
19. TOTAL FIXED LOSSES	dB	2.0		2.0
20. TOTAL LOSSES (PATH AND FIXED)	d8		146.7	
21. ANTENNA DIAMETER	Feet	8.0		8.0
22. ANTENNA TYPE		SOUD		SOLID
23. ANTENNA GAIN	dBi	42.3		42.3
24. TOTAL ANTENNA GAINS	dB		84.6	
25. NET SYSTEM LOSS	d₿		62.2	
26. RADIO EQUIPMENT TYPE AND CAPACITY			ANALOG 600	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD 29. NET SYSTEM GAIN	d8m		-80.0	
30. MEDIAN RECEIVED POWER	dB dBm		112.0 -30.2	
30. FLAT FADE MARGIN	dB		49.8	
31. DISPERSIVE F.M. (DIG. ONLY)	₫B	-	73.5	
32. COMPOSITE FADE MARGIN	dB		49.8	
WEIGHTED RAYLEIGH PROPAGATION REI	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	-1
SIESTANNISMANISES ASTOL	0.25 TO 6			0.25
MEAN ANNUAL TEMPERATURE	Deg F			50.0
DIVERSITY SPACING	Feet			30.0
NON-DIVERSITY OUTAGETIME	Sec/yr			9.5
NON-DIVERSITY AVAILABILITY	Percent			99.99997
SPACE DIVERSITY IMPROVE FACTOR	Desimal			1250 7
SPACE DIVERSITY IMPROV. FACTOR SPACE DIVERSITY DUTAGE TIME	Decimal Sec/yr			1350.7
SPACE DIVERSITY AVAILABILITY	Percent			100.00000
OLUME PIAMINITI VAVIDADIDI	1 ercerit			100.0000
RELL SHOAT HAUL GEVENTVE	Sec/yr			192.0

NATIONAL TELECOMMUNICATION			MINISTRATION	
US DEPARTMENT O MICROWAVE RADIO PATH CA			ET	30-Jul-92
PROJECT NAME	_	2		
ENGINEER		ż		
FREGUENOV (Giz)		1.90		
4 CITE NAME		?		
1. SITE NAME	5			?
3. LATITUDE, North,	Degrees	?	-	?
	Minutes Seconds	?		?
4. LONGITUDE, West,	Degrees	7		?
4. LONGITODE, 11431,	Minutes	7	 	?
	Seconds	?		?
5. SITE ELEVATION, AMSL	Feet	?		7
6. AZIMUTH FROM NORTH	Degrees	0.0	i	0.0
7. PATH LENGTH	Miles		50.0	
8. PATH ATTENUATION	dB		136.2	
10. TOWER TYPE		?		?
11. ANTENNA HEIGHT,AGL	Feet	100		100
12. TRANSMISSION LINE LENGTH	Feet	110		110
13. TRANS, LINE TYPE		1 5/8" FOAM		1 5/8" FOAM
14. TRANS, LINE LOSS	dB/100'	1.25		1.25
15. TRANSMISSION LINE LOSS	dB	1.4		1.4
16. MISCELLANEOUS LOSSES	<u>d8</u>	0.5		0.5
17. PROTECTED TERMINAL LOSS	dB	?		?
18. DIVERSITY RECEPTION LOSS	dB	?		?
19. TOTAL FIXED LOSSES	d8	1.9	100.0	1.9
20. TOTAL LOSSES(PATH AND FIXED)	₫B	100	139.9	400
21. ANTENNA DIAMETER 22. ANTENNA TYPE	Feet	10.0 GRID		10.0
23. ANTENNA GAIN	dBi	33.3		GRID 33.3
24. TOTAL ANTENNA GAINS	d8	33.3	66.6	33.3
25. NET SYSTEM LOSS	₫₿	' 	73.4	
26 FADIO EDUIRMENT TYPE AND CAPACITY			ANALOG 600	
27. MINIMUM TRANSMITTER POWER	dBm		32.0	
28. RECEIVER THRESHOLD	dBm		-80.0	
29. NET SYSTEM GAIN	dB		112.0	
30. MEDIAN RECEIVED POWER	dBm		-41.4	
30. FLAT FADE MARGIN	₫B		38.6	
31. DISPERSIVE F.M. (DIG. ONLY)	ďB		?	
32. COMPOSITE FADE MARGIN	dB		38.6	
WEIGHTED RAYLEIGH PROPAGATION REI	LIABILITY F	OR ATMOSPHE	RIC MULTIPATI	4
E ESTANGUMATE FACTOR	0.25 TO 6			0.25
MEAN ANNUAL TEMPERATURE	Deg F			50.0
DIVERSITY SPACING	Feet			60.0
MON-DIVERSITY OUTAGE TIME	Section			163.0
NON-DIVERSITY AVAILABILITY	Sec/yr			99.99948
HON-SITERISTIT ATAICABILITY	reicen(33.33340
SPACE DIVERSITY IMPROV. FACTOR	Decimal			70.1
SPACE OWERSHY OUT AGE TIME	Sec/yr			2.3
SPACE DIVERSITY AVAILABILITY	Percent		`	99.99999
BELL SHOPT HAUL GEJECTIVE	Sec/yr			320.0
	yi			JE5.5